

V. *Descriptions of nine British Species of the Genus Hylæus, Latr.; together with some Notes on the Economy of Osmia leucomelana and Epeolus variegatus.* By F. SMITH, Esq.

[Read 7th March, 1842.]

BEFORE I enter on the description of the British species of the genus *Hylæus*, I would make a few observations which have occurred to me upon the habits of these insects. I have never had the good fortune to discover their nidi, but have always considered them parasitical, having observed them in some numbers frequenting a bank where *Andrena Afzeliella*, Kirby, nidificates in abundance. Late in the evening I have found (as also on a dull day) as many as three or four inclosed within the petals of the dandelion; these were generally males. I have a pair of the *Hylæus annulatus*, which I took in copula; proving Kirby's species to be correctly assimilated. This genus is remarkable for the singularities of form exhibited in different organs of some of the individuals of which it is composed, as described under the respective species.*

Genus HYLÆUS, Latr.

Head orbicular; eyes lateral, long, extending to the base of the mandibles, distant at the vertex; stemmata placed in a triangle. Antennæ 12-jointed in the female, 13-jointed in the male; scape long in some species, in others considerably dilated; in some males it is fringed with hair. Thorax globose, punctured, as well as the head and abdomen. Abdomen ovate; in some males oblong.

Sp. 1. *Hylæus annulatus*.

Aculeate; black, face generally with pale yellow stripes close to the eyes. Antennæ black. Thorax with a pale spot on the tegulæ and tubercles, sometimes on the collar; anterior and intermediate

(a) The following is a list of the species described:—

1. *Hylæus annulatus*, Kirby's Monograph.
2. ——— *annularis*, Do.
3. ——— *signatus*, Do.
4. ——— *dilatatus*, Do.
5. ——— *pallidens*, Kirby's MSS. No. 113.
6. ——— *cornutus*, Do. No. 118.
7. ——— *plantaris*, New species.
8. ——— *punctulatissimus*, Do.
9. ——— *hyalinatus*, Do.

legs with silvery hair at the base and apex of the tibiæ at the joints; posterior tibiæ annulated with yellow; all the tarsi black.

Male.—Face yellow, with a black line running from the base of the mandibles to the base of the antennæ, and a transverse one near the top of the angle formed. Antennæ black, slightly fulvous beneath. Thorax black; anterior tibiæ with a rufous line in front; posterior legs annulated with pale yellow; all the tarsi are pale at their base. Sometimes a pale spot on the tubercles and tegulæ.

Length, 3 lin. to $3\frac{1}{3}$.

Sp. 2. *Hylæus annularis*.

Aculeate; black; head nearly round; a fulvous spot below the base of the antennæ, sometimes obsolete. Antennæ slightly fulvous beneath. Thorax, with the tubercles, a spot on the tegulæ, sometimes on the collar, yellow; base of all the tibiæ yellow. Wings slightly coloured. Abdomen with a few whitish hairs on each side of the first segment, all the margins piceous.

Male.—Face yellow. Antennæ fulvous beneath, rather obscurely so; a yellow spot on the collar; all the tarsi pale at their base; anterior tibiæ with a rufous stain in front, intermediate and posterior pairs annulated with pale yellow.

Length, 2 to 3 lines.

Sp. 3. *Hylæus signatus*.

Aculeate; black. Antennæ fulvous beneath; scape black; face with an obscure fulvous line close to the eyes. Thorax with a white spot on the tegulæ and tubercles. Wings hyaline; anterior tibiæ with a rufous line in front; all the tibiæ fulvous at their extreme base. Abdomen very finely punctured; a fringe of white hair on the lateral margins of the first segment; the ventral also covered with white hairs, which are thinly scattered along the margins of all the segments.

Male.—Face pale yellow or white. Antennæ fulvous beneath. Thorax, anterior legs, with their tibiæ, rufous in front; the posterior plantæ white at their base. Abdomen covered with a fine silvery pile.

Length, 3 to $3\frac{1}{2}$ lines.

N.B.—The males of this species I have frequently found to be larger than the females.

Sp. 4. *Hylæus dilatatus*. (Pl. III. fig. 1, and details.)

Black; face pale yellow; mandibles black at the base, then yellow, with their apex rufescent. Antennæ black above, fulvous beneath, the apical segment totally so; the scape remarkably dilated, subquadrate, convexo-concave; the upper half black, beneath yellow. Thorax, a yellow spot on the tegulæ, one on each side of the collar, also on the tubercles; tibiæ yellow, anterior and intermediate, with a black stain behind; posterior tibiæ annulated with black; the wings fuscous. The abdomen covered with a fine silvery pubescence, particularly the margins of the segments.

Length, 3 lin.

This species is an astonishing instance of what almost appears disproportionate enlargement. The scape of its antennæ, says Mr. Kirby, resembles a "patella," or deep dish; but if viewed on its concave side, it certainly bears a striking resemblance to an ear; and although I would not boldly declare, with a learned professor, "these are its ears," still I consider them admirably adapted for collecting the vibrations of sound. Immediately behind the concavity of the scape, on the face of the insect, is a longitudinal smooth depression, extending to its outer margin, so that a passage for the vibrations of sound (should such a mechanical apparatus be the intention as I have described) is here admirably executed. I have examined the concavity under a Codrington lens, and find it perfectly smooth; not the slightest indication of any aperture or communication either with the joints of the antennæ, or where the scape inosculates with the head. I have drawn a figure of the insects, as well as an outline of the face, and concave side of the scape. This species appears to be rare. I am indebted to Mr. Samuel Stevens for my specimen, captured in Sussex.

Sp. 5. *Hylæus pallidens*, Kirby's MSS.

Male.—Black; scape of the antennæ with a yellow line in front; face white; the mandibles yellow. Thorax more pubescent than in the other species, particularly beneath; anterior tibiæ yellow, with a brown stain behind; the femora with a yellow line in front; intermediate and posterior tibiæ yellow at their base; all the plantæ yellow; remaining joints of the tarsi pale; claws rufous; wings fuscous. Abdomen piceous, with a fringe of white hair on each side of the first segment.

Length, 3 lin.

Sp. 6. *Hylæus cornutus*, Kirby's MSS. (Pl. III. fig. 3.)

Aculeate ; black ; clypeus bidentate ; a singular prominence below the scape of the antennæ, which is black ; antennæ fulvous beneath. Thorax finely punctured ; a white spot on the tegulæ ; the base of the anterior and intermediate tibiæ pale ; posterior tibiæ annulated with pale yellow. Wings fuscous, paler at their tips. Abdomen very finely punctured.

Length, 3 lines.

The remarkable horns which arm the clypeus have doubtless their uses, and probably indicate some difference in the habit or economy of this species.

This species is rare ; I only know of one specimen in Mr. Kirby's Collection in the Entomological Society's Cabinet, and one in my own, which was captured on Cove Common, Hants.

Sp. 7. *Hylæus plantaris*, (New species.)

Male.—Black face, with scattered hairs. Antennæ much shorter and thicker than in the other males ; entirely yellow, slightly stained with fulvous above ; scape considerably dilated, with a black streak above, fringed with long hairs, particularly on the approximating margins ; a smooth shining depression on the face, into which the scapulæ fall. Thorax with a yellow spot on each side of the collar ; a white spot on the tegulæ ; base of the wings yellow, remainder fuscous ; anterior tibiæ with a yellow stain in front, the intermediate yellow at their base, posterior annulated with yellow ; all the tarsi yellow ; the intermediate plantæ dilated at the base in front. Abdomen elongate, with longish pale hairs at the extreme lateral margins of the segments, particularly the apical ones ; on the underside a patch of fulvous hair, in the centre of the second segment.

Length, 3 lin.

Of this species I took two specimens on Cove Common, Hants.

This I believe to be a new species, and in one respect a remarkable insect—viz. the dilatations of the plantæ of the intermediate legs at their base ; the antennæ are much shorter than in the other males of the genus, they are also proportionably thicker ; the scape is considerably dilated, and fringed with long stiffish hairs on the margins, which approximate ; there is also a difference in the form of the joints of the tarsi ; and on the underside of the abdomen, on the second segment, is an angular patch of short fulvous hairs, somewhat similar to the ♂ of *Chelostoma* ;

these patches of hair will be observed to form a guard or cushion to the ventral segment of the bodies of the males of several species of bees which repose in flowers, in which they are found curled up.

Sp. 8. *Hylæus punctulatissimus*.

Aculeate; black, with a cream-coloured stripe close to the eyes, crescent-shaped. Antennæ black. Thorax coarsely punctured; the collar on each side, tubercles, and a spot on the tegulæ, pale yellow; wings coloured; anterior and intermediate tibiæ pale at their base; posterior tibiæ with a narrow pale ring at their base. The abdomen with a fringe of white hair on each side of the first segment, and the abdomen laterally clothed with a fine silvery pile.

Male.—Face yellow; scape of antennæ with a yellow line in front. Antennæ piceous beneath. Thorax coarsely punctured; a yellow spot on the tegulæ; the legs piceous; anterior tibiæ fulvous in front, the intermediate yellow at the base, the posterior annulated with yellow; the intermediate and posterior plantæ yellow; all the tarsi piceous.

Length, 3 lines.

N.B. Var. γ of Kirby's *annularis*, on comparison I find is the δ of my *punctulatissimus*.

I have little hesitation in placing these, as sexes, together. I took them in company at Coomb, in flowers, and met with no other species.

Sp. 9. *Hylæus hyalinatus*.

Aculeate; head black; very minutely punctured, with deep scattered punctures intermixed. Antennæ black, slightly piceous beneath. Thorax, like the head, is finely punctured, with large deep punctures intermixed; wings hyaline, nervures black; all the legs black; posterior pair annulated with pale yellow. Abdomen black, with silvery hairs on the ventral segment.

Male.—Black; face yellow. Antennæ with the scape black, the remaining joints fulvous beneath; the face is very coarsely punctured; the thorax has a scattered silvery pubescence, particularly beneath; a yellow spot on the tegulæ and tubercles; wings hyaline; anterior femora yellow, with a brown stain behind; intermediate and posterior tibiæ annulated with yellow; all the plantæ and following joint yellow, the rest rufescent.

Length, 2 lines.

I received this species from Mr. Thwaites ; it is very distinct from any of the foregoing, and is a smaller species.

Five years ago I captured a single specimen of *Osmia leucomelana*, which I saw enter an excavated bramble stick. From the cocoons contained in it, I confidently expected to breed the *Osmia*, but to my great surprise, in the month of June in the following season, a new species of *Epipone* was developed. I visited the locality, in which I found the bee, the four following summers, and although I occasionally found a specimen,—in one instance a male and female in the same stick,—still I could not discover one containing the nest of the bee. This season, on the 19th of July, I again visited Cove Common, Hants, and after a careful search I succeeded in finding some excavated sticks. My plan is, if possible, to cut the sticks in the evening, first carefully stopping up the entrance, as the probability is that the female bees will then be in them ; by this means I took three females and five of *Epipone levipes*.

The burrow formed by the *Osmia* is different to that of *Epipone*, which clears out all the pith previous to forming her cells. The *Osmia* excavates to the depth of about four inches, her course through the pith being somewhat serpentine ; having arrived at the necessary depth, she commences alternately to widen and contract her burrow equally, each alternation occupying three-eighths of an inch ; this she repeats five times—(see Pl. III. fig. 4) ; these spaces form the receptacles of the pollen and honey ; having stored up a sufficient quantity in the furthest cell, she next deposits an egg against the mass, one end of which is pushed into it, and by that means retains its position ; she then forms a division between the stored and next empty cell, this division is about the thickness of a common address card, and is composed of small pieces of leaf, mixed with some gummy substance, and so compactly is it finished, that I fancied it was circular pieces of leaf stuck together, until I immersed one in hot water, when the gum or wax dissolved. In one of the sticks in which I found a female *Osmia*, the third cell was just completed, or stored, and an egg deposited. The egg is about one line long, tapering a little at each end, and is in fact about the size and form of a small carraway seed, only that the surface is so exceedingly smooth, that, under a high magnifying power, I could not detect the slightest puncture or reticulation. Supposing the egg in question to have been deposited on the day that I discovered the nest, the larvæ appeared on the tenth.

Chancing to meet with a bank in which was a large colony of *Colletes succincta*, I pulled down a portion of it, and found large quantities of their cocoons, some empty, some containing the bee fully developed, others the stores of pollen and honey recently collected. I filled a few boxes with the cocoons containing insects, and on examining them at home, in two of them I found a specimen of *Epeolus variegatus*. This little bee has long been considered a parasite, but I believe this is the first instance of its being found in the nest of another bee. More than two-thirds of the cocoons were empty which I found in the bank, or I might probably have discovered more of *Epeolus*. This is an instance of great disparity of resemblance between the bee and its parasite; and I think it will be found, that close resemblance is only to be met with, and is only apparently necessary, among the social bees, for there can be no want of opportunity for a parasite to deposit unobserved her egg in the nest of a solitary bee; whereas in the social species they would be sure of detection; and, consequently, a very close resemblance is frequently met with, apparently to aid them in fulfilling the purposes assigned to them: as in the instance of the different species of *Apathus* parasitic upon *Bombus*, and also in the *Diptera* frequenting their nests.
